CLAIMS

What is claimed is:

1. A system for detecting and analyzing chemical and/or biological aerosols in a sample cloud in the air, said system comprising:

a radiation source, said radiation source directing a radiation beam towards the cloud, said radiation beam heating the cloud to raise the temperature of the cloud relative to its background; and

a spectrum analysis device responsive to emissions from the cloud, said spectrum analysis device generating an emission spectrum of the chemical and/or biological aerosols in the cloud from the emissions.

2. The system according to claim 1 wherein the spectrum analysis device is a spectrometer.

3. The system according to claim 2 wherein the spectrometer is selected from the group consisting of Fourier transform infrared spectrometers, grating tuned spectrometers, opto-acoustic spectrometers, circularly variable filter spectrometers, linear variable spectrometers and MEMS spectrometers.

4. The system according to claim 1 wherein the spectrum analysis device is a spectral imager.

5. The system according to claim 1 wherein the radiation source is selected from

the group consisting of a microwave radiation source, a millimeter-wave radiation source, a CO_2 laser, an HF laser, a DF laser, a solid-state laser and a fiber laser.

6. The system according to claim 1 further comprising a beam expander telescope, said beam expander telescope receiving and expanding the radiation beam before it radiates the sample cloud.

7. The system according to claim 1 further comprising a receiving telescope, said receiving telescope being responsive to the emissions from the cloud and focusing the emissions on the spectrum analysis device.

8. A system for detecting and analyzing chemical or biological aerosols, said system comprising:

a chamber for holding the aerosol, said chamber including a first end and a second end, said first end having a first window;

a radiation source, said radiation source generating and directing a radiation beam through the first window to heat the aerosol within the chamber; and

a spectrum analysis device positioned relative to the first end of the chamber, said spectrum analysis device being responsive to emissions from the sample emitted through the first window, said spectrum analysis device generating an emission spectrum of the aerosol.

9. The system according to claim 8 wherein the first window is a high transmission

window selected from the group consisting of polished salt windows, zinc selenide windows and other suitable windows having anti-reflective coatings.

10. The system according to claim 8 wherein the sample chamber includes at least one fan for agitating a powder into the aerosol.

11. The system according to claim 8 wherein the spectrum analysis device is a spectrometer.

12. The system according to claim 11 wherein the spectrometer is selected from the group consisting of Fourier transform infrared spectrometers, grating tuned spectrometers, opto-acoustic spectrometers, circularly variable filter spectrometers, linear variable spectrometers and MEMS spectrometers.

13. The system according to claim 8 wherein the spectrum analysis device is a spectral imager.

14. The system according to claim 8 wherein the radiation source is selected from the group consisting of a microwave radiation source, a millimeter-wave radiation source, a CO_2 laser, an HF laser, a DF laser, a solid-state laser and a fiber laser.

15. A method for detecting and analyzing chemical and/or biological aerosols in a sample, said method comprising:

heating the sample relative to its background by directing a radiation beam from a radiation source towards the sample; and

generating an emission spectrum of the chemical and/or biological aerosol by receiving emissions from the sample in a spectral analysis device.

16. The method according to claim 15 wherein the spectrum analysis device is a spectrometer selected from the group consisting of Fourier transform infrared spectrometers, grating tuned spectrometers, opto-acoustic spectrometers, circularly variable filter spectrometers, linear variable spectrometers and MEMS spectrometers.

17. The method according to claim 15 wherein the spectrum analysis device is a spectral imager.

18. The method according to claim 15 wherein the radiation source is selected from the group consisting of a microwave radiation source, a millimeter-wave radiation source, a CO_2 laser, an HF laser, a DF laser, a solid-state laser and a fiber laser.

19. The method according to claim 15 wherein the sample is in a cloud in the air.

20. The method according to claim 15 wherein the sample is confined within a sample chamber.